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	)	
A National Broadband Plan for Our Future	)	GN Docket No. 09-51

COMMENTS OF
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An Economic Perspective on a U.S. National Broadband Plan

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Abstract

This paper responds to the U.S. Federal Communications Commission's April 2009 request for guidance in designing a national broadband plan. We argue that the U.S. market for Internet services is working well overall, as evidenced by nearly ubiquitous coverage, rapid adoption, large investments, and increasing speeds. Still, the market is not working well for all people in all places, and we offer a framework for considering policies intended to mitigate those issues.

The core of the paper consists of nine recommendations. Two of our recommendations are general. First, the government should ensure that its interventions do more good than harm. Second, the government should define clear, measurable, goals that do not benefit particular firms, technologies, or regions.

The remaining seven recommendations provide specific guidance for a U.S. broadband plan. They include: liberalizing spectrum, gathering and analyzing data on broadband demand, targeting resources to where they are most needed, defining broadband access to maximize social gain, designing mechanisms that will achieve the government's broadband goals at the lowest social cost, vigorous antitrust enforcement, and designing policies to facilitate rigorous evaluation.

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An Economic Perspective on a U.S. National Broadband Plan

Robert Hahn and Scott Wallsten

1. Introduction

Governments around the world are increasingly concerned about ensuring that their citizens have access to world-class broadband infrastructure and services. They believe that providing widespread access to the Internet is an important factor in increasing productivity, economic growth, and innovation.

Policymakers have a range of options to help ensure greater access to the Internet. One, and the one favored by most economists, is to create an economic environment that fosters competition to provide a wide array of innovative infrastructure and services.

Still, a purely market-driven approach may not be perfect. Some individuals and regions may remain unserved or under-served because it may not be economic to build and operate the necessary infrastructure. In addition, a relatively small number of competitors for providing Internet services in particular markets may raise antitrust concerns.

In April 2009 the U.S. Federal Communications Commission asked for guidance on how it should address these issues in developing "…A National Broadband Plan for Our Future," (FCC 2009b). This paper responds to the FCC request for comments, and puts the issue in a broader economic context.

We begin by characterizing the market for Internet services in the United States, which we think is working well overall, as evidenced by nearly ubiquitous coverage, fast rates of adoption by consumers, continued large investments in infrastructure, and increasing speeds.[1] We also recognize that although the market is working well overall, it is not working well for all people in all places. We thus offer an economic approach for thinking about how and when to intervene in these markets. Our approach builds on the simple idea that interventions should do more good than harm. Short of that, interventions should meet any objectives set forth by the government at minimum cost to society.

The core of the paper consists of nine recommendations related to designing a U.S. broadband policy. Two of our recommendations are general. The first says that the government should ensure that its interventions do more good than harm, and the second says that the government should define clear, measurable, goals that do not pick winners and losers.

The remaining seven recommendations provide specific guidance for a U.S. broadband plan. They include: liberalizing spectrum, gathering and analyzing data on broadband demand, targeting resources to where they are most needed, defining broadband access to maximize social gain, designing mechanisms that will achieve the government's broadband goals at the lowest

[1] We use the phrase "broadband market" to refer loosely to the overall state of broadband infrastructure, content, and adoption. This definition is too broad for, say, antitrust analyses, which must careful define precise markets for appropriate analysis.

social cost, vigorous antitrust enforcement, and careful evaluation of each new broadband program.

Section 2 of the paper provides background on the broadband market and the economics of broadband. Section 3 offers seven recommendations for developing a national broadband plan. Section 4 concludes.

2. Background on the U.S. Broadband Market and the Economics of Broadband

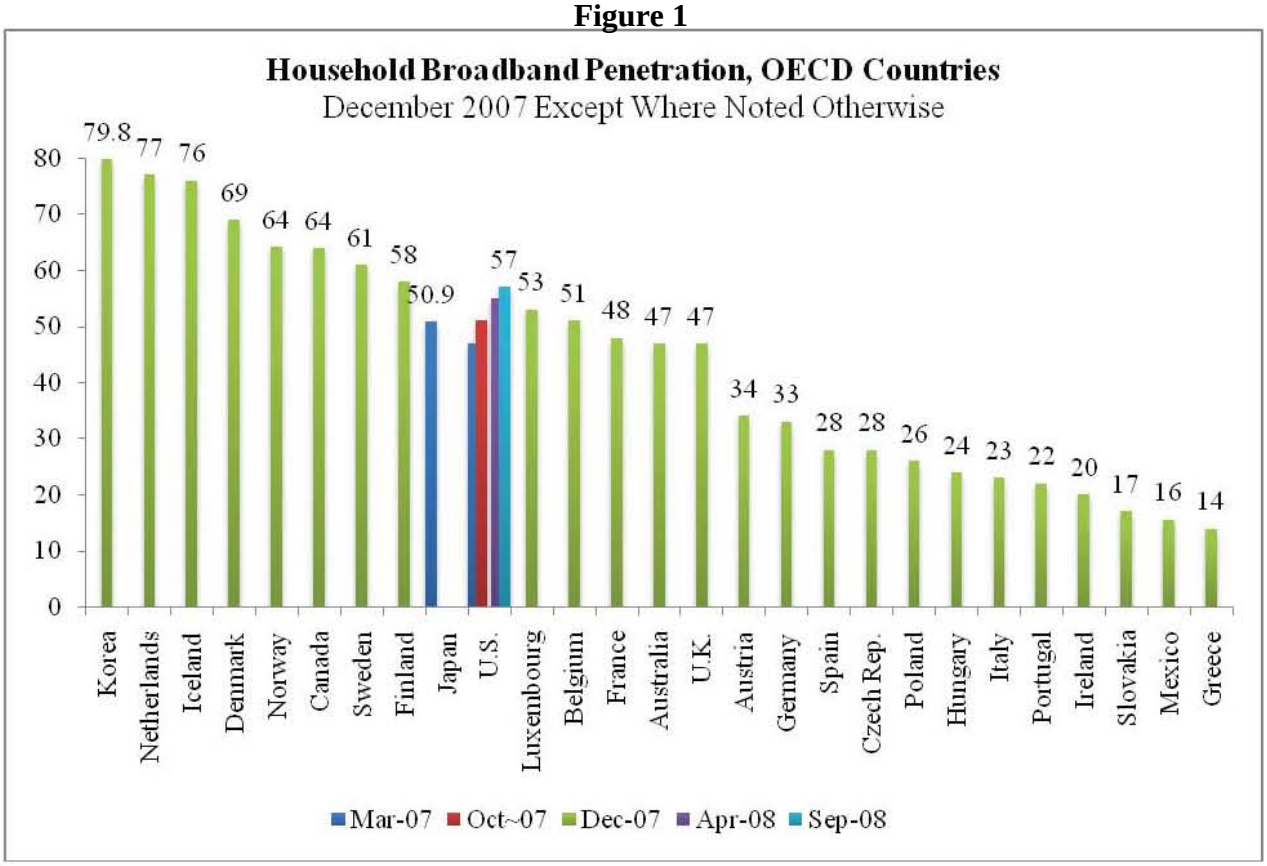
Substantial evidence suggests that the broadband market is working well in the United States. 57 percent of all U.S. households subscribe to broadband Internet service (Horrigan 2009a). Figure 1 shows the share of households with broadband for OECD countries. The figure shows that the U.S. ranks about 10th. By the end of the first quarter of 2009 the U.S. had 72 million wired broadband subscribers by one count,[2] not including connections at universities and businesses that connect via special access lines. That is more than ten times the number at the end of 2000.

We realize that these numbers are inconsistent with broadband rankings put out by, for example, the OECD, which ranks the U.S. 15th in its most recent estimates. As explained in detail in Wallsten (2009b), the OECD bases its rankings on connections per capita and also mixes residential and business connections together in inconsistent ways across countries. A key problem with per capita rankings is that average household sizes differ across countries, meaning that different numbers of people are served by a residential connection in each country. Countries with larger households, like the U.S., Japan, and Korea, will ultimately have fewer connections per capita than countries with smaller households.

Differing household sizes mean that when every household in every OECD country has a broadband connection, the U.S. will rank 18th among OECD countries in per-capita comparisons and much lower when compared to all countries. The number of connections per *household*, instead, is a better measure. This point should be important to policymakers who care about measuring the effects of their policies. The per capita rank of the United States cannot improve—and will decrease—over time simply for statistical reasons. As a result, any policy will appear to fail if measured on change in the U.S. per capita rank instead of household rank.

[2] http://gigaom.files.wordpress.com/2009/05/q12009broadbandstats.gif

Figure 1



Source: European Commission (2008); Canadian Radio-television and Telecommunications Commission (2008); Impress R&D survey (Japan); NIDA "Survey on the Computer and Internet Usage 2008.2" (Korea); Pew Internet and American Life Project, U.S. Census Current Population Survey as reported by the NTIA (U.S.); Statistics Iceland "Use of the Internet by Households and Individuals 2007;"[3] Statistics Norway "The Internet Survey" 4Q 2007;" Australian Bureau of Statistics "Household Use of Information Technology, Australia, 2007-08;"[4] eMarketer "Mexico Online 2009."[5] New Zealand, Switzerland, and Turkey omitted as comparable data was not readily available.

The numbers discussed above do not include wireless broadband connections, which increased to more than 50 million by the end of 2007.[6] Determining the availability, use, and effects of wireless broadband is important but presents other difficulties. Wireless is not a perfect substitute for wireline broadband. Yet, as wireless networks improve they become increasingly good substitutes for wired networks. Some carriers, for example, are now bundling small notebook computers with access to their 3G networks.[7] Others are promoting devices that allow users to convert the 3G signal into a Wi-Fi signal for themselves and a small number of additional nearby users.[8] The empirical degree of substitutability between wireless and wireline broadband remains unknown. Because wireless substitutability is an important component of

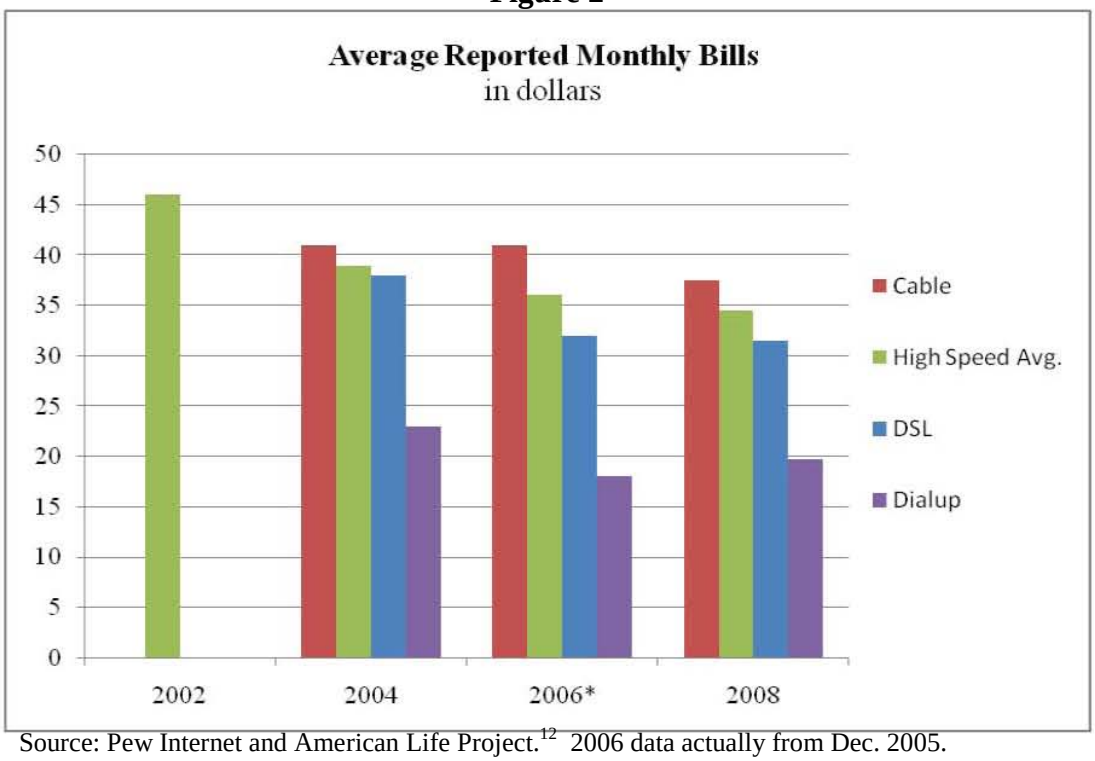
[3] Data is for 2007 in general; report dated May 2007. Broadband penetration inferred from internet access (84%) and proportion of internet users with xDSL (89%) or other broadband (2%).
[4] December 2007 estimated by averaging June 2007 and 2008 rates.
[5] Data is for 2007 in general; source table dated March 2008.
[6] The latest data available from the FCC are from December 2007 (Federal Communications Commission 2009a).
[7] See, for example, here: http://www.cnn.com/2009/TECH/ptech/05/14/cnet.verizon.netbook/
[8] See, for example, here: http://www.nytimes.com/2009/05/14/technology/personaltech/14pogue-email.html

determining competition in the market, data collection (discussed below) should be designed in a way to estimate how much of a substitute—and thus how important a competitor—wireless is to wired broadband.

Broadband is ubiquitously available in the U.S. According to the Pew Internet and American Life Project only 14 percent of people who do not have broadband—4.5 percent of the total population—report that they do not have it because it is not available (Horrigan 2009b). Cable broadband is available to 92 percent of the population,[9] or 96 percent of user premises where cable TV is available. DSL service is available to 82 percent of homes wired for a telephone.[10] Wireless broadband is available to roughly 96 percent of Americans,[11] though, as discussed above, we do not know precisely how substitutable wired and wireless broadband are. Satellite broadband service is available everywhere, offering ever faster speeds, though the high orbit of the satellites that the service uses introduces latency that makes real-time applications less effective.

Prices are not easy to estimate due to the prevalence of different broadband plans and bundles of Internet, telephone, and television. They are also difficult to evaluate over time because of increasing speeds and the typically higher prices for higher speeds. Data from the Pew Internet and American Life Project show that consumers report that the prices they pay for broadband generally fell from 2002 through 2008.

Figure 2

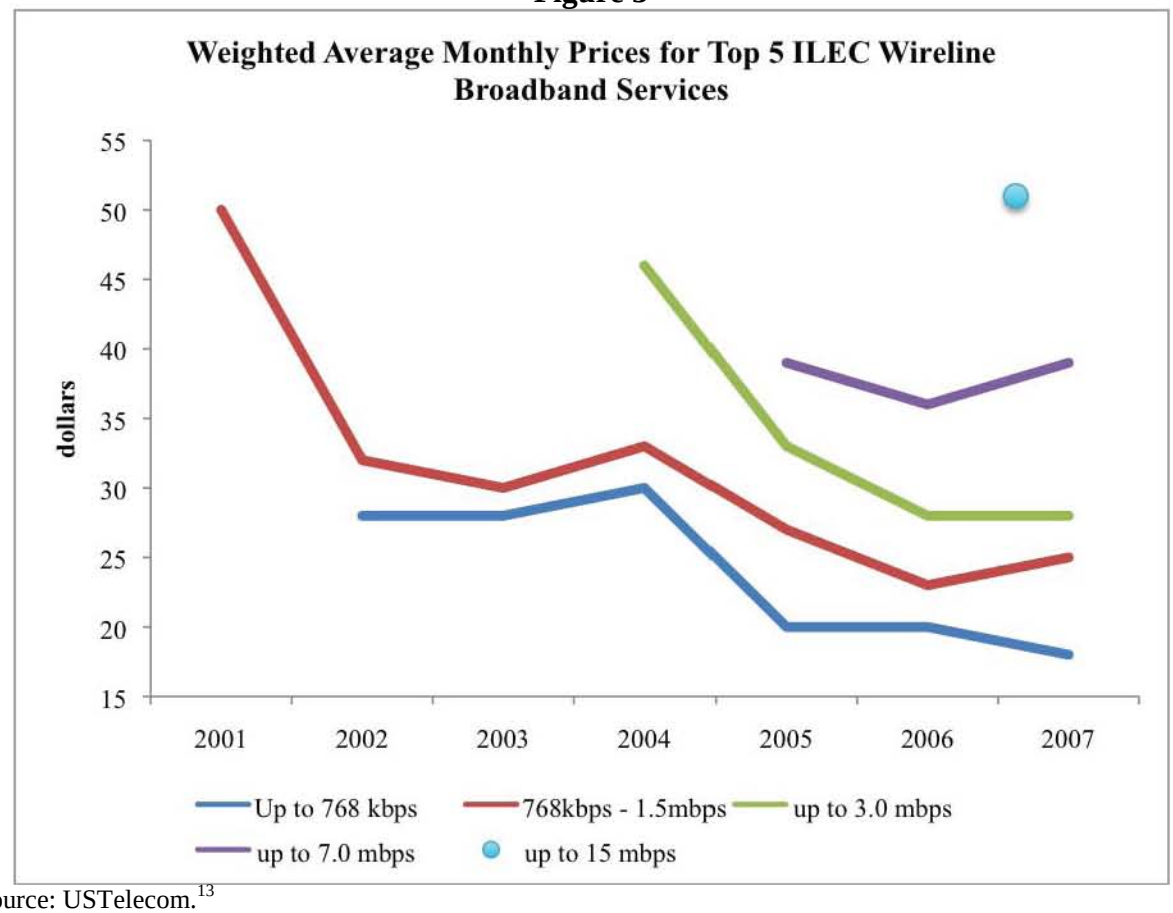


Source: Pew Internet and American Life Project.[12] 2006 data actually from Dec. 2005.

[9] http://www.ncta.com/StatsGroup/Availability.aspx
[10] FCC (2009b).
[11] See http://www.costquest.com/costquest/docs/CostQuest_3G_Competition_Report.pdf
[12] Horrigan (2004;2007;2008).

Other information shows this information in a different light. Figure 3 shows the weighted average price, as calculated by USTelecom, for broadband connections of various speeds over time offered by the incumbent telecommunications companies. It is noteworthy that in 2007 consumers could purchase plans offering 7-15 mbps for the same amount they paid for 768kbps – 1.5 mbps in 2001. Their data shows generally declining prices for broadband plans that offer up to 3 mbps and that the monthly price for a connection that offers 7 – 15 mbps in 2007 was about the same as for a 768 kbps connection in 2001. The data also show that, as one would expect, prices for faster speeds are higher than prices for lower speeds. Moreover, those prices seemed to increase somewhat between 2006 and 2007. The general move towards faster speeds—as discussed below—combined with this price increase could lead to higher consumer expenditures on broadband.

Figure 3

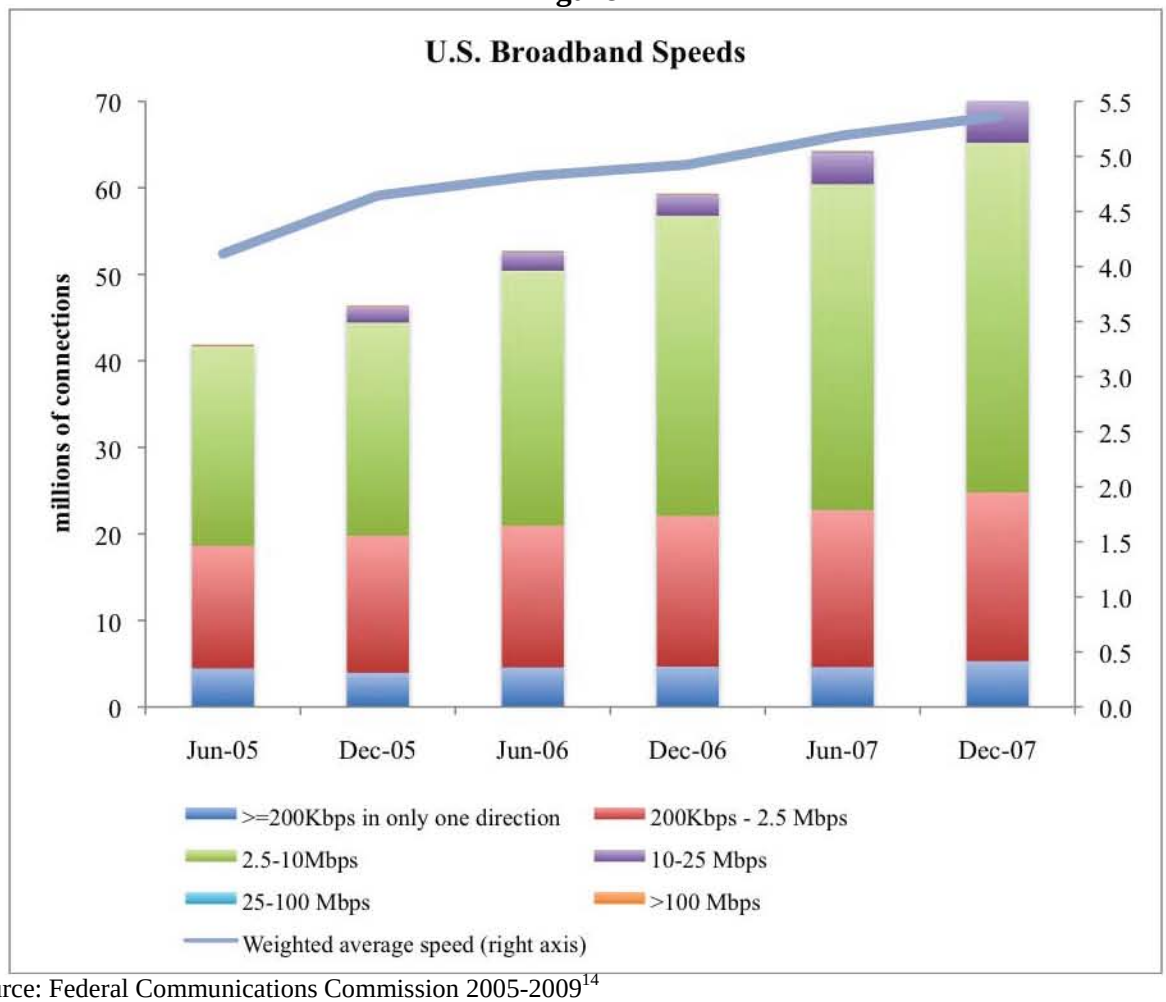


Source: USTelecom.[13]

Speeds, meanwhile, have been steadily increasing. Figure 4 shows a slow but steady increase in the average speed of broadband lines (excluding universities and most businesses), with most of the growth happening at 2.5 mbps and up.

[13] http://www.ustelecom.org/uploadedFiles/Learn/Broadband.Pricing.Document.pdf

Figure 4

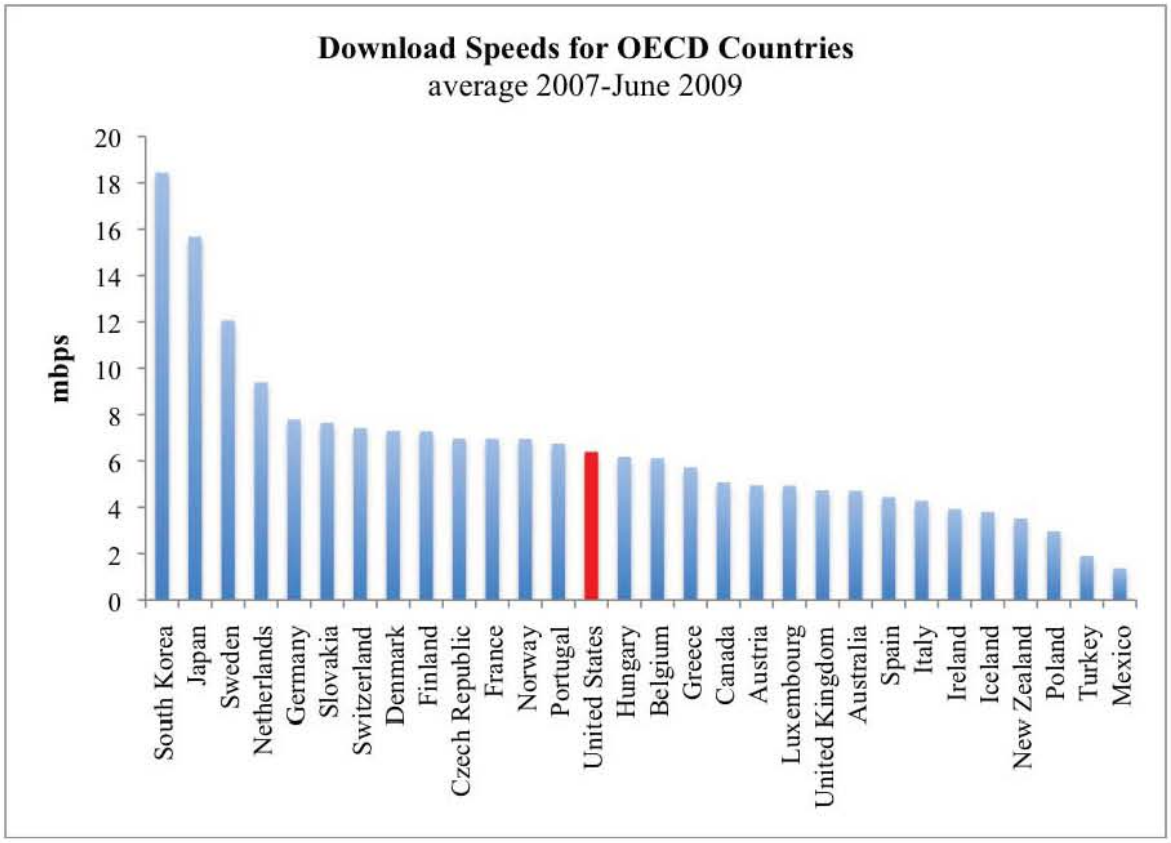


Source: Federal Communications Commission 2005-2009[14]
Note: Weighted average is based on Wallsten's derivation from FCC data. The weighted average is the sum of each category's midpoint speed multiplied by the share of connections in that category. 0.765 Mbps is used as the speed for the slowest category.

The speed picture, however, is mixed. Figure 5 shows average measured speeds among OECD countries.[15] The figure reveals several points. First, it shows that, as commonly believed, consumers in South Korea and Japan have the fastest connections on average. Yet, their speeds are far below the 100 mbps often claimed. Second, average download speeds in the U.S. measured about in the middle of OECD countries. Yet, the figure also shows that after Japan, South Korea, Sweden, and the Netherlands, about 14 countries grouped together with speeds averaging between 6 and 7.5 mbps.

[14] Federal Communications Commission (2005;2006a;2006b;2007a;2007b;2008a;2008b;2009a)
[15] Data from Akamai (2009) look nearly identical, except that they measure every country's speed as being somewhat slower, and the relative position of the U.S. somewhat higher.

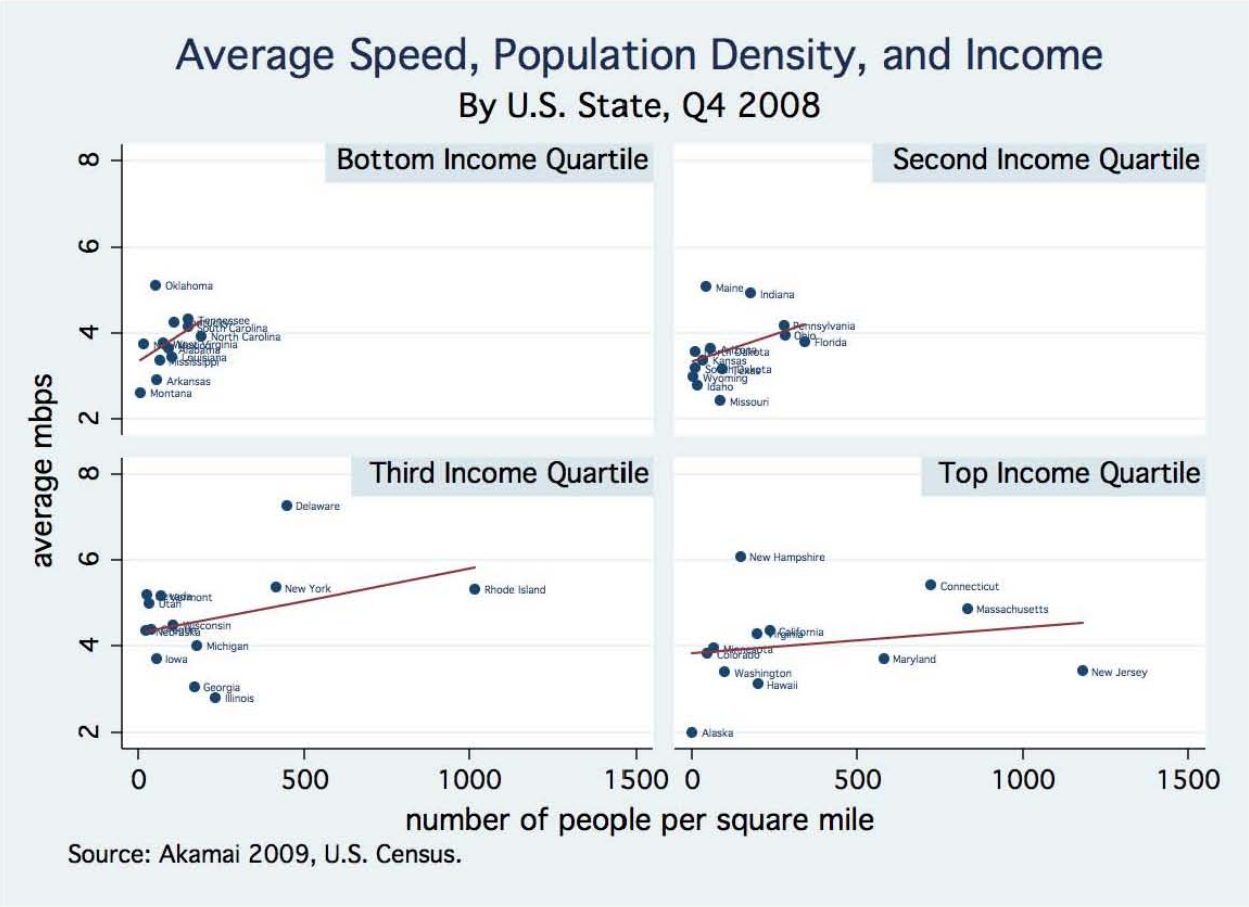
Figure 5



Source: speedtest.net.
Note: Averages are based on tests from nearly 56 million unique IP addresses.

There is a great deal of variation in average speeds across the US. As a collection of states, then, it is probably not surprising that the US average is comparable to the EU average. Figure 6 shows that speeds in the U.S. range from more than 7 mbps in Delaware to about 5.4 mbps in New York (or about the Asian average) down to about 2 mbps in Alaska. The figure also shows a strong correlation between speed, income, and population density. The correlation between population density and speed appears to decrease with the median income of the state.

Figure 6



These speeds are likely to increase rapidly over the next several years as broadband providers significantly upgrade their networks. Cable networks are upgrading to DOCSIS 3.0, which allows broadband speeds in excess of 100 Mbps. Comcast has promised to upgrade 65 percent of its customers by the end of 2009,[16] and some analysts expect the cable industry will have upgraded nearly 100 percent of its broadband by the end of 2013.[17] Verizon is continuing to roll out fiber-to-the-home (FTTH), and had 2.8 million FTTH customers after the first quarter of 2009.[18] AT&T has been building fiber to the cabinet (FTTC) and today has 1.3 million subscribers.[19] Meanwhile, wireless companies are investing heavily to complete their nationwide 3G networks and are beginning work on the next generation of wireless broadband, which in principle are capable of speeds rivaling those of new wired broadband platforms.

[16] http://www.dslreports.com/shownews/Comcast-65-Will-Get-DOCSIS-30-By-Years-End-100979?nocomment=1
[17] Pike & Fisher, March 2009. http://www.broadbandadvisoryservices.com/researchReportsBriefsInd.asp?repId=662
[18] "Verizon Communications Reports Revenue, Earnings and Cash Flow Growth in 1Q 2009" at http://news.vzw.com/news/2009/04/pr2009-04-27.html
[19] "U-verse update: 1Q09" at http://www.att.com/Common/merger/files/pdf/U-verse_Update.pdf

Rethinking government's role in broadband policy

Just because conditions are generally improving does not mean that broadband conditions are ideal for all consumers in all parts of the country. In other words, the lack of an overarching problem does not necessarily mean that no problems exist or that government has no role. For example, low income individuals are far less likely to subscribe to broadband than are wealthier individuals even where broadband is available. Some subscribers have access to only a single wired provider, which is thus less likely to act in a competitive manner. And even though the share of the population without access to any wireline provider is only between five and eight percent, that still represents about 15-25 million people. The market may not be serving those groups well.

The government needs to decide whether, where, and how it should promote broadband. Economists tend to believe that a necessary condition for intervening in a market is that it exhibits some kind of market failure—for example, if a firm profitably exercises monopoly power or if the service has network externalities. But the presence of a market failure alone is not sufficient to justify intervention. The proposed intervention should also be expected to generate benefits that exceed costs.

The most likely market failure with respect to broadband is the presence of positive network externalities. In particular, everybody who is online benefits when more people join—both because they could, in principle, connect with them (direct externalities) and also because it increases the incentives to build new online services (indirect externalities). In either case, the new subscriber does not reap all the benefits of subscribing. It is therefore possible in theory that even a competitive market may not provide enough broadband because it cannot easily internalize the externalities.[20]

The existence of a positive externality does not, however, mean that it is easy to identify and correct the market failure. Consider the examples above of groups that do not currently benefit from the broadband market. Not every geographic region without broadband represents a market failure. In some places, for example, the costs of bringing wired broadband may exceed the total benefits, even after including positive externalities, meaning that the market is providing an appropriate signal about the value of providing service there.

Similarly, fully informed consumers who truly place little value on broadband—not because they cannot afford it or are otherwise unable to use it—do not necessarily represent a problem that needs to be fixed. Their very low willingness to pay for broadband plus the value of the externalities of their connecting may not exceed the cost of encouraging them to subscribe.

Most economists, however, recognize that societies do not make decisions on the presence of market failures alone. Nations, states, or locales may decide through their democratically elected representatives to provide some minimum level of certain goods or services—health care being a prime example. In such cases where government sets a goal,

[20] There may be negative externalities as well, such as congestion. We assume Internet providers will help ensure a reasonable, if not efficient, level of congestion.

economists can play a useful role by suggesting ways to meet that goal at the lowest overall social cost.

3. Recommendations for a national U.S. Broadband Strategy

The FCC's notice of inquiry for developing a national broadband plan states: "Our goal must be for every American citizen and every American business to have access to robust broadband services" (p. 3). The notice suggests a four-step plan for reaching this goal.

> First, the Commission must analyze the most effective and efficient mechanisms for ensuring broadband access by all people of the United States. Second, the Commission must include a detailed strategy for achieving affordability of such service and maximum utilization of broadband infrastructure and service by the public. Third, the Commission must include an evaluation of the status of deployment of broadband service, including progress of projects supported by the grants made pursuant to this section. Finally, the Commission must include a plan for use of broadband infrastructure and services in advancing a broad array of public interest goals, including consumer welfare, civic participation, public safety and homeland security, community development, health care delivery, energy independence and efficiency, education, worker training, private sector investment, entrepreneurial activity, job creation and economic growth, and other national purposes. (Federal Communications Commission 2009b)

The FCC is supposed to develop a national plan by February 2010. This is a tall order, and we empathize with Commission economists and lawyers who will be charged with developing the plan. Our goals here are more modest—namely, to set forth a series of eight recommendations aimed at increasing overall economic efficiency while allowing the government to meet its objectives.

Recommendation 1: *When the government intervenes in the broadband market it should avoid distorting the market where it is working.*

The medical profession instructs doctors to "first, do no harm." Policymakers would be wise to follow that lead. The government can avoid impairing the broadband market's inherent dynamism if it tailors its interventions carefully.

Recommendation 2: *Policymakers should define broadband policy goals carefully to create policies that have clear objectives and measurable outcomes and that do not arbitrarily benefit particular technologies or firms.*

Policies should be defined carefully so that they have well-specified goals and measurable outcomes so that lawmakers and citizens can observe whether policies are meeting their objectives. The broadband stimulus program is inconsistent with this recommendation. The program aims to create jobs and to improve broadband. Those two goals are not inherently consistent with each other, making it less clear what the government hopes to achieve (see, for example Wallsten 2009a). Government could maximize the number of additional jobs by focusing heavily on new infrastructure whether it is needed or not. Alternatively, government

could maximize improvements in broadband adoption by subsidizing computers and broadband subscriptions for low income people, although that would have little effect on jobs. And while either of those goals could generate measurable outcomes, the lack of a clear objective makes it difficult to know what metric the government should use to evaluate the program's success.

The agencies charged with carrying out the law have the unfortunate task of deciding which objective to maximize or making funding decisions in an arbitrary fashion as they try to balance the two goals without any guidance. Either way, the agencies may be subjected to criticism in the future for either failing to produce enough jobs or for failing to significantly improve broadband.

Similarly, policies must be designed so as not to benefit particular technologies or firms. Some, for example, believe that only fiber can provide acceptable broadband speeds. But cable, with its DOCSIS 3.0 technology, has demonstrated that it can provide similar speeds. Wireless technologies are also improving rapidly and can provide ultra-high speed connections, even if they are not yet available to consumers.

Policymakers should note that in the 1990s many groups thought that ISDN was the broadband technology of the future. The Texas PUC, for example, required Southwestern Bell Telephone Company to make ISDN available to all Texas consumers (Common Carrier Bureau 1998). In 1997, a consumer group called for ISDN price controls because "the best available here-and-now residential technology is ISDN" and "if new technologies like cable modems or ADSL are truly seven years from widespread deployment, we must do something about the present" (Love 1997).

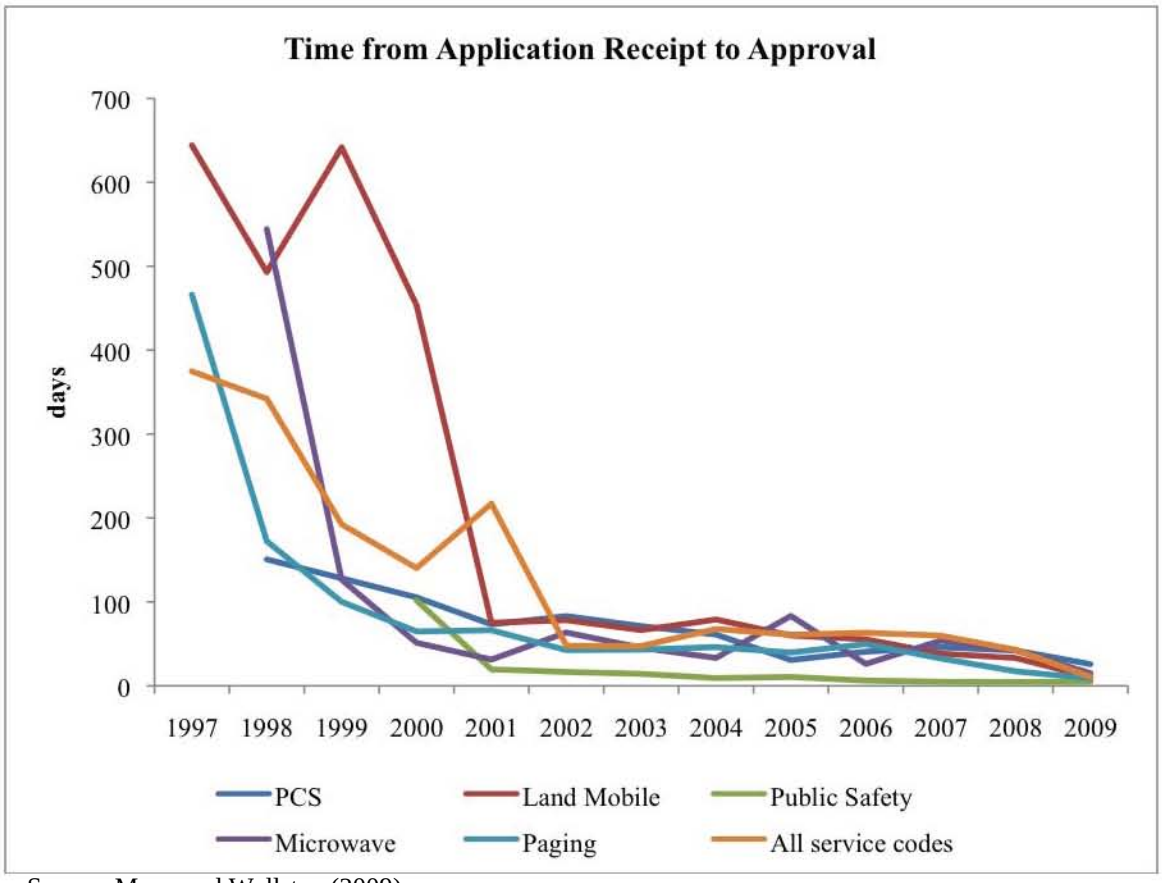
As it turned out, ISDN was a fairly short-lived technology for broadband that was expensive and relatively slow, supporting speeds only up to 128 Kbps. DSL and cable modems supplanted ISDN by providing faster speeds at lower costs. We should be humble in our predictions and take care to avoid deterring future innovations by trying to determine which technologies will succeed.

Recommendation 3: *Congress and the Federal Communications Commission should make more spectrum available to private parties and allow all license holders to use spectrum for any purpose or to trade it, so that spectrum will go to its highest-valued uses.*

Spectrum liberalization would not only support Internet access, but also other economically desirable uses of the spectrum. Moreover, spectrum liberalization has the potential to generate tens of billions of dollars in consumer benefits each year (Hazlett and Munoz 2008). Twenty-seven economists, including several now in President Obama's administration, signed a statement in 2006 making this same recommendation (Bailey, et al. 2006).

The FCC should be given credit for its role in liberalizing spectrum so it can be allocated more efficiently. It has also undertaken several policy reforms over the past decade to facilitate trading of spectrum in secondary markets, which are crucial to ensure that spectrum continues to flow to its highest-value uses as demand and supply conditions change. Figure 7 shows that the FCC has shortened dramatically the average approval time for reselling spectrum rights.

Figure 7



Source: Mayo and Wallsten (2009).

Yet, government can do far more to facilitate innovation. A large amount of spectrum is still used for low-value television broadcast. That spectrum should be reallocated to its higher-value uses. Policymakers have several options for accomplishing this important task. One is to continue reclaiming it slowly and re-auctioning the spectrum, as was done for the 700 MHz spectrum auction in January 2008.

Another option is to free that spectrum of any restrictions on how it can be used (aside from those necessary to prevent interference) and allow current license-holders to use or sell it as they see fit. Such an option is likely to be politically unpopular because it would lead to windfall profits for many current license-holders, including those who may not have paid for the rights to use that spectrum. As unpalatable as the thought of undeserved windfall profits may be, those are likely to pale in comparison to the benefits that would flow to consumers once that spectrum was no longer bottled up in its current, largely unproductive, use. At a minimum, the government could declare all unused spectrum currently allocated to broadcast to be henceforth unencumbered and auction it in an "overlay" plan described by Hazlett (2004).

Government itself also holds highly valuable spectrum and uses it inefficiently. The spectrum inventory called for by Congress will shed more light on how much spectrum that

represents and how it is currently being used.[21] Moving the spectrum away from government use and toward public use is not easy. NTIA has tried and failed through several administrations to find ways of convincing agencies to release their spectrum. Agencies do not have adequate incentives to give up their spectrum. Consumers stand to benefit immensely from freeing up the hundreds of megahertz of spectrum currently underutilized if senior policymakers and politicians were to make that a priority.

Recommendation 4*: Improve Demand Data and Analysis of Demand*

Good policy decisions rely on good data and analysis, and broadband policy is no exception. Government should avoid creating a broadband crisis by taking time to gather relevant data and do careful analysis to help ensure the development of sensible policies.

The Broadband Data Improvement Act (BDIA) will go a long way to addressing data problems.[22] Nevertheless, we believe the BDIA and the stimulus program place too much emphasis on creating street-level maps of broadband availability and not enough emphasis on household, consumer, and business surveys. Such surveys are likely to be more useful for policymaking and are less expensive to conduct and update.

Broadband data collection has, to date, followed the tradition in telecommunications of counting lines and connections. Yet, the fast spread of broadband and the varied ways in which people and businesses use it makes such counts increasingly irrelevant. For example, counts of lines now routinely miss most business and university connections, simply because it is not possible for providers to count each device connected to the large data pipes that serve those institutions. Each counted connection to a household, meanwhile, may be used by a number of household members, making the line count only loosely correlated with the number of people using broadband connections. Line counts are thus likely to underestimate both the number of connections and the number people who use broadband. At the same time, counts of wireless broadband users are primarily counts of the number of broadband-enabled wireless devices.[23] Not all people who have broadband-enabled wireless devices use those broadband services. For that reason, counts of wireless broadband are likely to overestimate the number of wireless broadband users.

The solution to these problems is to use surveys rather than counts. Surveys can be done relatively inexpensively and quickly, and can be rigorously designed to answer specific policy questions. To its credit, the BDIA directs the U.S. Census to include questions about broadband

[21] See S.649, "Radio Spectrum Inventory Act" introduced March 19, 2009.

[22] We feel it important to note, however, that even though the FCC has been heavily criticized with respect to the data it makes available, the agency has been among the best in the world in its data collection and dissemination and should be given credit.

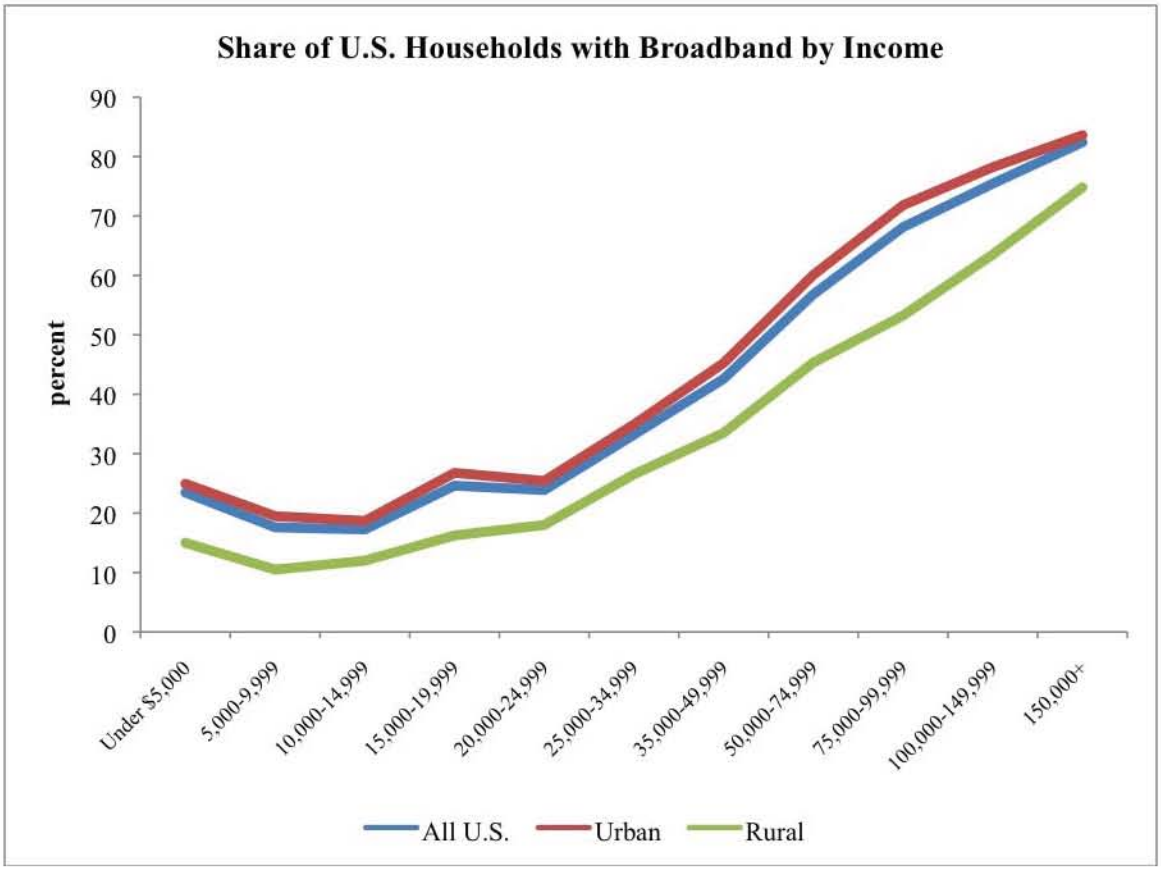
[23] Instructions for Form 477 on which firms provide broadband data instructs providers to "Exclude subscribers whose choice of content is restricted to only customized-for-mobile content, and exclude subscribers whose subscription does not include, either in a bundle or as a feature added to a voice subscription, a data plan providing the ability to transfer, on a monthly basis, either as specified or an unlimited amount of data to and from Internet sites of the subscriber's choice" (IA p. 8). However, the form then asks mobile wireless providers to "[r]eport the number of subscribers whose mobile devices are capable of sending or receiving data at information transfer rates exceeding 200 kbps in at least one direction" (IB, p. 10) http://www.fcc.gov/Forms/Form477/477inst.pdf.

in its annual American Community Survey, which collects data at the household level. The Census should be encouraged to take this seriously and Congress should allocate money so that the Census can do these surveys well. They should be done with input from NTIA and the FCC, who can help design questions to answer relevant policy questions. Policymakers should consider coordinating broadband-related questions in surveys conducted by other agencies, as well. The Bureau of Labor Statistics (BLS), for example, gathers important data through its Consumer Expenditure Survey. Though data-gathering agencies always face pressure from many groups to add questions to their surveys, it may be worthwhile considering whether the Expenditure Survey could be used to gather complementary broadband data.

Already some of the most useful information about broadband comes not from counts, but from surveys conducted by the Pew Internet and American Life Project, along with the few questions the U.S. Census asked about broadband in a 2007 household survey. The data show clearly that low-income individuals are much less likely to have broadband than are wealthier individuals. Because most of these people are in urban or suburban areas availability is not at issue.

These data suggest that if increasing broadband adoption is a goal then policies should probably focus more on assisting low-income individuals, and less on supplying specific geographical regions, such as rural areas that may be quite expensive to serve. But even for the case of lower-income individuals, more information is needed to design a cost-effective policy. How much, for example, are lower-income individuals willing to pay for computers and broadband access and what, therefore, is the minimum subsidy necessary for them to subscribe? Some groups, such as the One Economy Corporation, have been implementing programs to bring broadband to disadvantaged groups for several years; careful evaluation of their programs may be useful for designing cost-effective national programs.

Figure 8



Source: U.S. Census 2007, as reported in NTIA (2008).

Surveys should be designed carefully to help fill the many gaps in our knowledge of broadband. In particular, most empirical research to date has focused on broadband supply, in part because only supply data are generally available. We know little about broadband demand.

What little we do know about demand comes largely from Pew. The data suggest that nearly half of all people without broadband have no interest in it. This finding is consistent over time, but leaves several important policy questions unanswered. Is there any price at which those who claim to have no interest would choose to subscribe? Alternatively, might these people change their mind as the value of being connected increases? The trend over time suggests that the answer to both questions is "yes." While half of all people without broadband at any given point in time claim to have no interest, the number of people without broadband has steadily shrunk, meaning that some people who once claimed to have no interest now do. Have they subscribed because prices went down or because more content is now available, making broadband worth more to them? The answers to those questions have important policy implications. If people would subscribe at some price less than available subscriptions prices we can calculate the subsidy necessary to get them online and then determine whether the benefits exceed the costs. If, however, new subscribers chose to go online because broadband became more valuable to them rather than because of falling prices, then we might consider other policy

options such as making more government services available online. Similarly, we could then estimate the costs of those efforts and determine whether the benefits would make it worthwhile.

We do not have a good understanding of what aspects of broadband people value. Perhaps the most rigorous work on this topic was done by Professors Scott Savage and Donald Waldman (2005;2004). Their research suggested that residential users placed a high premium on the always-on nature of broadband, but also valued speed and reliability. Unfortunately, they used data from 2002, when broadband demand was probably quite different from today. Government does not know, for example, how much people value higher speeds. Such knowledge is crucial for informing policies that affect infrastructure development.

Recommendation 5: *The government should use an expansive definition of broadband in defining access.*

It is tempting to define a minimum speed threshold to be considered broadband, but policymakers should take several points into consideration when doing so. First, what is the reason for creating a definition? Might it simply be more useful to find ways of reporting data on available speeds? Second, broadband has many attributes, and consumers do not all value those attributes identically. Some consumers may value speed highly, but others may simply value the always-on connection relative to dialup or low latency to ensure high-quality real-time applications.

Policymakers should take care that whatever definition they choose, if any, does not arbitrarily weight one attribute of broadband, such as speed, over another, such as latency. Consumers could easily be made worse off if policies mistakenly emphasize one attribute when, over time, it turns out that another may have been more important.

Recommendation 6: *The government should focus on providing broadband access where such access is very limited or non-existent.*

Focusing on areas where access is limited or non-existent will yield policies that are less likely to result in market distortions. If direct subsidies for broadband are provided, they should be carefully targeted to low income households. Furthermore, they should not exceed the best estimate of the positive network externality that the person confers on other users of the network if the aim is to ensure that the policy results in net social benefits.

If the general objective is to help poor people, a more efficient method is probably to redistribute income through the tax system (Arrow, et al. 1996). Low income individuals could then choose to purchase broadband if it were sufficiently valuable to them relative to other needs.

Recommendation 7: *The government should make use of cost-effective mechanisms for reaching the targets it defines.*

We agree with Congress' focus on effectiveness and efficiency. Any policies the government chooses for advancing broadband should be done as efficiently as possible. If subsidizing infrastructure, for example, the government should treat those expenditures the way

it would any other large purchase and competitive bidding through auction processes to get the biggest bang for the buck. Indeed, 71 economists advised the government to use a system of reverse auctions for awarding the broadband stimulus funds (Milgrom, et al. 2009). Under such a scheme firms would bid for subsidies to provide broadband in designated areas, and the firms that request the smallest subsidies would receive the grant.

Recommendation 8: *The antitrust enforcement agencies should be directed to investigate and, if the evidence warrants, file actions to prevent abuses by Internet service providers with market power that distort competition on the Internet.*

Many potential concerns in the broadband market—from monopoly pricing to fears that providers will degrade content that competes with their own—are inherently antitrust issues. Thus, where competition remains insufficient to discipline providers, the government's existing authority should police an Internet service provider's behavior. If, for example, a service provider with monopoly power offered high quality service to an online gaming provider but refused to sell the same level of service to an unaffiliated voice over Internet protocol provider in order to protect its own subsidiary in the voice phone business, the antitrust laws should open the service provider to a suit, as 17 economists advised in 2007 (Baumol, et al. 2007).

Recommendation 9: *Broadband policies should be designed so that their effectiveness can be rigorously evaluated to determine what works and what does not.*

Government interventions are rarely evaluated properly. One reason is that they are frequently not designed in a way that facilitates analysis of cause and effect. For example, funding a project that is ultimately successful does not necessarily mean that the subsidy was responsible for that success. Similarly, an unsuccessful project does not necessarily mean that an intervention failed. Indeed, some failures are to be expected. Wallsten (2009a) discusses this issue in detail in the context of the broadband stimulus program. In particular, he notes the strengths and weaknesses of different approaches for evaluation, including randomized trials and econometric approaches that compare areas that receive subsidies with those that do not. Such evaluations can be used to improve program effectiveness over time.

4. Conclusion

This paper provides guidance on devising a U.S. national broadband plan. Data on prices and service quality suggest that the market for broadband in the U.S. is working well, but further actions could improve overall economic welfare or meet social objectives, such as supplying broadband to specific groups. We argue that more research and analysis is needed for the government to spend money wisely. This is especially true in the area of assessing broadband demand.

Precisely because the market for broadband is working well, the government needs to be especially careful not to introduce policies that could have unintended, adverse consequences. The best way to avoid this result is to not intervene where the market is working well, and to target interventions to address specific social concerns, such as the availability of broadband to low income groups.

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